Engineering Standard

SAES-J-502 18 February 2013

Analyzer Shelters

Document Responsibility: Instrumentation Standards Committee

Saudi Aramco DeskTop Standards

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1 Scope

This Standard prescribes minimum mandatory requirements for the fabrication of pre-engineered, packaged analyzer systems which shall include the prefabricated shelter, sampling systems, analyzers, ventilation and electrical services.

This standard does not apply to performance specifications for individual analyzers or sampling handling systems.

Commentary Note:

Analyzer cabinets (small housing in which analyzers are installed individually and where maintenance of the analyzer is performed from outside the cabinet with the door open) are outside the scope of this standard.

This entire standard may be attached to and made a part of purchase orders.

2 Conflicts and Deviations

2.1 Any conflicts between this standard and other applicable Saudi Aramco Engineering Standards (SAESs), Materials System Specifications (SAMSSs), Standard Drawings (SASDs) or industry standards, codes and forms shall be resolved in writing by the Company or Buyer Representative through the Manager, Process and Control Systems Department of Saudi Aramco, Dhahran.

2.2 Direct all requests to deviate from this standard in writing to the Company or Buyer Representative, who shall follow internal company procedure SAEP-302 and forward such requests to the Manager, Process and Control Systems Department of Saudi Aramco, Dhahran.

3 References

The selection of material and equipment, and the design, construction, maintenance, and repair of equipment and facilities covered by this standard shall comply with the latest edition of the references below, unless otherwise noted.

3.1 Saudi Aramco References

Saudi Aramco Engineering Procedure

SAEP-302	*Instructions for Obtaining a Waiver of a Mandatory Saudi Aramco Engineering Requirements*

Saudi Aramco Engineering Standards

SAES-A-112	*Meteorological and Seismic Design Criteria*

SAES-B-068	*Electrical Area Classification*
SAES-J-002	*Technically Acceptable Instruments*
SAES-J-505	*Combustible Gas and Hydrogen Sulfide in Air Detection Systems*
SAES-J-902	*Electrical Systems for Instrumentation*
SAES-J-903	*Intrinsically Safe Systems*
SAES-P-100	*Basic Power System Design Criteria*
SAES-P-104	*Wiring Methods and Materials*
SAES-P-111	*Grounding*
SAES-P-123	*Lighting*

Saudi Aramco Materials System Specification

12-SAMSS-014	*Pre-Engineered Metal Buildings*

3.2 Industry Codes and Standards

American National Standards Institute

ANSI/NEMA ICS 6	*Enclosures for Industrial Controls and Systems*
ANSI/NFPA 70	*National Electrical Code (NEC)*
ANSI/NFPA 496	*Purged and Pressurized Enclosures for Electrical Equipment in Hazardous (Classified) Areas*
ANSI Z97.1	*Safety Glazing Material Used in Buildings*

American Society for Testing and Materials

ASTM A269	*Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service*

European Committee for Standardization

CENELEC EN 50018	*Electrical Apparatus for Potentially Explosive Atmospheres - Flameproof Enclosures Ex d.*

National Association of Corrosion Engineers

NACE MR0175/ISO 15156	*Petroleum and Natural Gas Industries – Materials for Use in H_2S Containing Environments in Oil and Gas Production*

4 Design

4.1 General Requirements

Commentary Note:

Walk in analyzer shelters provide a controlled environment for the operation and maintenance of complex on stream analyzers. Shelters protect analyzers against extreme ambient conditions (analyzers within analyzer shelters do not have to meet Saudi Aramco requirements for continuous operation in high ambient temperatures). For new projects, pre-engineered shelters supplied by a specialist system fabricator listed in SAES-J-002 offer the best option in terms of convenience, cost, system responsibility, and final product quality.

4.1.1 Pre-engineered shelters shall be shipped with analyzers installed and all systems (air conditioners, ventilators, purge systems, lighting and power supply systems) in place and tested before shipment.

4.1.2 Shelters shall be rainproof and dustproof and shall be designed to withstand the environmental conditions specified in SAES-A-112 Meteorological and Seismic Design Criteria.

4.1.3 Only analyzers and equipment associated with analyzer operation (e.g., programmers, control stations, etc.) shall be permitted inside the shelter. Electric panels for utility power shall be mounted outside the shelter.

Where plant instrument air is not available (e.g., Pipeline or Off-plot facilities), the instrument air supply system provided with the analyzer shall either be installed in separate shelter rooms or externally to the analyzer shelter.

4.1.4 Equipment located on the outside walls of shelters shall be protected from the weather by an overhanging roof or canopy type covering, or an attached enclosure.

4.1.5 Finished floor elevation shall be a minimum 8 inches above grade.

The shelter floor shall be sealed to prevent the ingress of gas or vapor.

Prefabricated shelters shall provide an integrated floor.

4.1.6 Inert gas shall not be used for purging an entire analyzer room and shall only be used for enclosure purging when instrument air is not suitable.

When inert gas is required to purge an enclosure within the analyzer shelter, a low Oxygen detector shall be provided inside the shelter. An alarm shall be initiated remotely at the DCS and a yellow beacon

activated outside the analyzer shelter door when the oxygen level drops below the safe occupational exposure limit.

Commentary Note:

Instrument air is preferred for enclosure purging as leakage of inert gases used for purging or pressurizing of enclosures in an analyzer room can deplete the room's oxygen.

4.1.7 All instruments shall be supplied per SAES-J-002, Regulated Vendors List for Instruments.

4.2 Shelter Location

4.2.1 A minimum free access of 3 m shall be provided to all exterior building sides.

Exception:

The intent is to provide adequate working space around analyzer shelters to facilitate routine maintenance (the movement of equipment in and out of the shelter, storage of gas cylinders, and working space for maintenance personnel) and to provide a clear path in the event of an emergency. A minimum of 1 m distance from the analyzer shelter to structural steel columns is acceptable provided free access to sample conditioning systems and exit doors is available.

4.2.1.1 Shelters designed to handle flammable gases and vapors shall be installed in Class 1, Division 2 (Zone 2) areas.

4.2.1.2 Shelters shall not be installed in Class 1, Division 1 (Zone 0 or Zone 1) areas.

4.2.1.3 Shelters designed to handle non-flammable liquids or vapors shall be located in non-classified areas.

4.2.2 Calibration gas and carrier gas cylinders containing flammable gas shall not be closer than 7.5 m to pumps or other possible sources of ignition.

4.3 Shelter Size

4.3.1 Shelters interior shall be large enough to allow adequate access and space for maintenance work. If operational or maintenance access is required to any equipment enclosure, provide a minimum free space of 1 meter on the side that requires access.

4.3.2 All shelters greater than 10 square meters in size, shall have at least two exits, located at opposite ends of the shelter.

4.3.3 Shelters shall provide internal space for the addition of one equivalent analyzer (minimum) with room for additional associated sample systems on the outside wall of the shelter.

4.4 Mechanical/Structural - Prefabricated Building

4.4.1 Pre-fabricated shelters shall be skid mounted and be supplied in accordance with Sections 5, 9, and 11 of 12-SAMSS-014, Pre-Engineered Metal Buildings for minimum design loads and design procedures.

Commentary Note:

It is not the intent of this standard to require non-industry standard buildings for analyzers shelters. Whenever possible, standard buildings should be used. However, structural details need to be checked to ensure that the building will meet design requirements for ambient conditions and basic construction requirements.

4.4.2 In addition to the basic construction requirements defined in 12-SAMSS-014 above, the shelter shall incorporate the following features:

4.4.2.1 Doors shall open outwards and shall have steel frames. Doors shall be sized to permit the removal and installation of equipment.

4.4.2.2 An inspection window shall be installed in each shelter door (reference EN 61285, Section 7.4.4). Glass shall be laminated or tempered safety glass meeting the requirements of ANSI Z97.1. Glass thickness shall be at least 6 mm. The laminated glass shall have a 1.5 mm interlayer.

4.4.2.3 All doors shall be equipped with quick-opening bars (panic bars) on the inside, which shall override exterior locks.

4.4.2.4 Roof or wall mounted ventilators and louvers shall be made of corrosion-resistant material.

4.4.2.5 Lifting holes in the skid shall be provided to permit a safe four-point lift to a minimum height of 6 m using spreader bars and a single hook.

5 Electrical Requirements

5.1 General Requirements

Electrical systems shall be designed and installed in accordance with ANSI/NFPA 70 National Electrical Code and SAES-P-100, Basic Power System Design Criteria.

5.2 Area Classification

Shelters shall be classified in accordance with SAES-B-068, Electrical Area Classification.

5.3 Equipment Certification

Equipment that is required by ANSI/NFPA 70 to be approved for use in a hazardous location shall be labeled, listed or certified as required by SAES-P-100, "Basic Power System Design Criteria."

5.4 Electrical Protection Design

Enclosures that are required to be approved for Class 1 locations per NEC Article 501 shall be ANSI/NEMA ICS 6 Type 7 or flameproof Ex d to CENELEC EN 50018.

Intrinsically Safe Systems shall only be used where other methods of protection are impractical. Intrinsically Safe Systems when required shall meet the requirements for P&CSD review of the design, system certification, and installation listed in SAES-J-903.

5.5 Equipment Purging

The enclosures of analyzers containing sources of flammable gases or vapors shall be equipped with a Type Z pressurization system in accordance with ANSI/NFPA 496 - 2003, Table 8.2.3. Purged analyzers shall be approved by UL, FM, CSA or CENELEC.

5.6 Grounding

Shelters and equipment installed inside shelters shall be grounded in accordance with SAES-P-111 and SAES-J-902. Intrinsically Safe Systems shall be grounded in accordance with certification requirements and SAES-J-903.

5.7 Wiring Methods

5.7.1 Analyzer power and services power supplies shall be designed and installed in accordance with SAES-P-104, Wiring Methods and

Materials. Motors, motor control equipment, and electric utility panels shall be mounted outside the shelter.

5.7.2 Instrument wiring systems shall be designed and installed in accordance with SAES-J-902, Electrical Systems for Instrumentation.

Commentary Note:

SAES-J-902 does not apply to the internal wiring requirements for analyzers or analyzer accessories.

5.7.3 Signal and power supply wiring shall be connected to termination boxes located outside the shelter. Separate boxes shall be provided for signal and instrument power supplies. Wiring shall be segregated in accordance with SAES-J-902.

5.7.4 Conduits and cables entering the analyzer shelter shall be sealed immediately outside the shelter using seals approved for hazardous areas in accordance with SAES-P-100, Basic Power System Design Criteria.

5.8 Lighting

5.8.1 Lighting shall be provided inside the shelter and for external sample systems and cylinder racks in accordance with SAES-P-123, Lighting.

5.8.2 Light fixtures and switches located inside the shelter shall be certified for Class 1, Division 2, Groups B, C, & D (Class I, Zone 2, Groups IIC, IIB, & IIA) as necessary depending on the materials being handled within the shelter.

5.9 Convenience Outlets

Shelters shall be provided with convenience outlets for the connection of test equipment. Receptacles shall be suitable for operation in Class 1, Division 1 areas, Group B, C or D (Class I, Zone 1, Groups IIC, IIB, & IIA) as necessary depending on the materials handled within the shelter.

Commentary Note:

Ventilation fans or the fans of air handling units and convenience outlets shall be certified to Class 1, Division 1 (Class I, Zone 1) so that they can be operated during an emergency situation where gas or vapors may be present. These requirements exceed those specified for analyzers and accessories that are required to be certified or protected as a minimum for Class 1, Division 2 (Class I, Zone 2).

5.10 Communications Equipment

Install all network communication devices associated with the analyzers (fiber

optic hubs, fiber optic WIC boxes, Ethernet hubs, data net hubs, etc.) inside analyzer shelter.

6 Analyzer and Systems Installation

6.1 General Requirements

6.1.1 Analyzers and ancillary equipment located inside the shelter shall be suitable for use in the electrical classified area in which they are installed but as minimum shall be certified for use in a Class 1, Division 2 (Class I, Zone 2) hazardous area and for the gas groups appropriate to the materials handled within the shelter.

Commentary Note:

When hydrogen is introduced within the shelter as the sample carrier gas, the equipment internal to the shelter does not have to be certified to gas group B or IIB + Hydrogen, provided the hydrogen supply is isolated outside the shelter upon loss of shelter pressurization.

6.1.2 All tubing and associated valves inside the shelter used for sampling, utilities (steam, air, water, etc.) and venting shall be furnished and installed with, and terminated at, bulkhead fittings on the shelter. Each bulkhead fitting shall be tagged (e.g., “sample in analyzer”, “sample return analyzer”, “air supply”, “sample vent analyzer”, etc.). Stainless steel, letter-stamped nameplates, secured by stainless steel screws to the bulkhead plate, shall be used. No internal field connections shall be required.

Exception:

When the sample conditioning system is supplied as a "factory assembled" field proven package, the sampling system can be integrated inside the analyzer box without bulkhead fittings.

6.1.3 Instrument tubing fittings shall be twin ferrule design, supplied by an approved supplier listed in SAES-J-002.

Tubing minimum wall thickness shall be supplied per the Table below.

Tubing Outside Diameter and wall thickness	½ inch - 0.049 inch
	⅜ inch - 0.035 inch
	⅛ inch - 0.028 inch

Tubing shall be seamless annealed ASTM A269 TP 316L maximum hardness Rockwell 80 with 316 SST fittings. Instrument tube and

fittings for use in sour service sample lines shall comply with NACE MR0175/ISO 15156.

6.1.4 Aluminum or plastic tubing shall not be used as instrument tubing external to an analyzer.

6.1.5 Instrument tubing shall be adequately supported and secured on tray or channel using clamps designed for and of the appropriate size for the tubing.

6.1.6 Tube runs shall not interfere with maintenance or obstruct space allocated for future analyzers.

6.1.7 The number of tube fittings in hydrocarbon and toxic sample and vent lines shall be kept to a minimum to reduce the risk of leaks.

6.1.8 Cylinder pressure regulators for sample, calibration and service fluids shall be located outside the shelter.

6.1.9 An isolation valve, located outside the shelter, shall be installed in each line that enters the shelter and shall be suitably marked.

6.1.10 Flow restrictors used in process streams and carrier gas streams shall be located outside the shelter. Needle valves with lockable handles may be used as flow limiting devices where required.

Commentary Note:

ANSI/NFPA 496, 9.3.1.1 requires that orifices or other flow limiting devices be installed outside and close to the wall of the shelter on any potential source of uncontrolled leakage. Uncontrolled leakage is one which cannot be diluted to below 25% of the lower flammable limit.

6.2 Sample Conditioning Systems

It is not the intent of this standard to cover detailed engineering requirements or performance specifications for sample handling systems. The following requirements cover only those aspects of the sampling handling system that impact the analyzer shelter design:

6.2.1 The sample conditioning system shall be designed to deliver a representative sample at a temperature, pressure, flow, and dew point consistent with the analyzer requirements. The analyzer vendor shall guarantee the performance of the sample conditioning system under normal, start up and process upset conditions and as specified in relevant analyzer specification sheet.

6.2.2 The sample conditioning system components shall be located inside a 316 SS cabinet with observation window and shall be mounted on the outside wall of the shelter opposite the associated analyzer. Window shall be 0.25 inch (6 mm) thick polycarbonate material or equivalent. Painted carbon steel enclosures are not permitted. All components shall be readily accessible for routine maintenance.

6.2.3 An isolation valve mounted on the outside of the shelter shall be provided in every hydrocarbon or toxic sample line entering the shelter and shall be suitably marked.

Exception:

Process streams that are prone to plugging are exempt from the above requirement provided the largest potential uncontrolled release within the shelter is limited to a volume that can be diluted to less than 25% of the lower flammable limit.

6.2.4 Sample transport system circulation ("fast") loops shall not be located inside the shelter.

Commentary Note:

Keep the volume of gas entering the shelter to an absolute minimum. The fast flow loop is designed to minimize the sample lag and is designed to optimize the speed of response of the analyzer. The analyzer slip stream, which is delivered to the sample conditioning system is extracted from the fast loop outside the shelter.

6.2.5 Lines containing flammable or hazardous materials shall enter the shelter through flow restriction orifices or lockable needle valves as specified in Section 6.1.10 of this Standard.

Exception

Flow restrictors are not to be placed in sample lines for sulfur plant tail gas analysis as it may cause sample line plugging. Also, when the sample conditioning system is supplied as a "factory assembled" field proven package, the sampling system can be integrated inside the analyzer box without flow restriction.

6.2.6 Sample lines that contain gas or vapor mixtures within the flammable range shall include flame arrestors or other means to prevent an explosion from propagating back into the sample line.

6.2.7 An isolation valve shall be installed immediately outside of the Sample Conditioning Cabinet to facilitate isolation of the SCC without going to the sample point.

6.3 Headers and Vents

6.3.1 Carrier Gas, Zero Gas, steam and instrument air purge headers shall be used whenever two or more analyzers share common services. An isolation valve shall be provided at each header take off point. All headers shall be provided with a minimum of two spare un-valved capped connections.

6.3.2 Air headers shall slope to a low point drain. A drain valve shall be installed inside the shelter. The drain line shall be connected to a bulk head fitting. A dual coalescing filter shall be installed on the exterior of the shelter upstream of the inlet bulkhead fitting.

6.3.3 The analyzer sample flow shall be vented to flare header or low pressure return. Immediately before GC sample valve injection, the trapped gas in the sample loop may be vented to atmosphere to ensure consistency of sample size injections. Vent headers may be used. In cases where back pressure or contamination could affect analyzer performance, completely independent atmospheric vents shall be provided. Vent headers shall be provided with a low point drain with isolation valve and separate bulk head connection.

6.3.4 Atmospheric sample vents shall be led to a freely ventilated point more than 3 m above the shelter and more than 7.5 m from any ventilation air intake or ignition source. The area around the vent discharges should be classified Class 1, Division 1 (Class I, Zone 0) per SAES-B-068, Electrical Area Classification.

6.3.5 Vents shall be protected against the entry of rainwater and to prevent wind affecting the performance of the analyzer.

6.4 Calibration and Carrier Gas Cylinders

6.4.1 All gas cylinders shall be stored in free standing racks outside the shelter. Separate racks shall be supplied for carrier gas, calibration, empty and full cylinders. Signs, minimum size 6 inches x 12 inches, shall be supplied to identify the contents and status of each cylinder.

6.4.2 Each storage position shall have a chain or bar to hold the cylinder in position.

6.4.3 Gas cylinder manifolds for multiple cylinders shall be constructed so as to permit the removal of any or all spare cylinders without stopping the gas flow from the other cylinder(s) in the manifold. The manifold's maximum allowable working pressure shall exceed the pressure in the

cylinders connected to it. The vendor shall supply flexible tube, fittings and cylinder regulators for each cylinder position including spare cylinders.

6.4.4 Each GC shall have a dedicated carrier header. Connecting multiple GC(s) on the same carrier gas header is not permitted.

Commentary Note:

If a carrier gas leak develops and multiple GCs are installed on the header it becomes difficult to determine which GC is the source of the leak.

6.4.5 Gas cylinder manifolds shall incorporate discharge safety devices. Safety devices shall not vent within the interior of the shelter.

7 Ventilation and Air Conditioning

General Requirements - Ventilation and air conditioning systems for analyzer shelters shall comply with ANSI/NFPA 496, Chapter 7 and 9 and the following requirements:

Commentary Note:

Analyzer shelters are force ventilated to prevent hazardous gas or vapor from accumulating inside the shelter. The inside of an analyzer shelter presents special safety problems because hazardous vapor or gas is being introduced into an enclosed structure. An unventilated shelter is classified as a Class 1, Division 1 (Class I, Zone 1) area. It is normal practice in Saudi Aramco to ventilate shelters to maintain a Class 1, Division 2 (Class I, Zone 2) area. This is achieved by ensuring that the worst single contingency leak can be diluted to less than 25% of it's LEL or occupational hazard threshold limit value. This design philosophy is based on a single contingency failure.

7.1 Analyzer shelters shall be provided with a ventilation (pressurization) system that continuously ventilates the shelter with a flow of clean air in accordance with ANSI/NFPA 496, Section 7.4.1 and an air conditioning system that maintains 75°F indoor air temperature (± 5°F throughout the shelter).

7.2 The ventilation and air conditioning requirements of the shelter shall be met using two separate HVAC/air handler units located at opposite ends of the shelter and an independent roof mounted ventilation fan as backup. The cooling capacity of each air conditioning system shall be adequate to handle all cooling loads of the shelter.

Commentary Note:

Dual redundant HVAC/air handler units provide a completely independent backup to facilitate continuous operation of process analyzers when HVAC maintenance is required. Roof mounting is required for the back-up ventilation fan to allow a built-in escape path for any accumulation of lighter-than-air flammable gas

concentrations during an extended ventilation failure and to provide a means to purge the shelter prior to starting the HVAC units.

7.3 Each HVAC/air handler unit shall be capable of providing the required ventilation air supply to dilute any release of flammable gas or vapor to a concentration less than 25% of the lower flammable limit (reference ANSI/NFPA 496, 9.2.1 (2). One shall operate continuously with the other as standby. Standby unit shall auto start upon loss of air flow from the primary unit.

7.4 Ventilation air shall be taken from a non-classified or Class 1, Division 2 (Class I, Zone 2) area.

7.5 Weight operated barometric louvers shall be used to maintain the internal pressure at 25 Pa (0.1 inch WG).

7.6 Dust filters shall be located in the ventilation air intake. Filters shall be installed at an easily accessible location.

7.7 Air flow shall ensure adequate cross ventilation and air discharge louvers shall be located at the top and bottom of the room to prevent the accumulation of vapor pockets.

Commentary Note:

Air flow shall capture flammable vapors as close as possible to the source, taking into account that vapors such as heavier-than-air hydrocarbon vapors shall be removed at floor level and lighter-than-air gases such as hydrogen and methane shall be removed at the ceiling.

7.8 Roof mounted ventilation fan shall be of a non-sparking construction and the drive motor shall be suitable for use in a Class 1, Division 1 (Class I, Zone 1) location for the gas groups appropriate to the analyzer applications. The roof mounted ventilation fan shall be capable of meeting dilution requirement of section 7.3 (ANSI/NFPA 496, 9.2.1 (2)) and provide the pressurization via weighted louvers of section 7.5 (ANSI/NFPA 496, 7.4.1) with both of the HVAC systems out of service.

Exception:

Ventilation fans or purge blower motors that are located external to the air handling ductwork shall be suitable for the hazardous area where they are mounted.

Commentary Note:

Air conditioners must be certified for the area in which they are installed. However, individual electrical components (ventilation fan motors, etc.) may be certified or the unit may be certified as a package. When hydrogen is introduced within the shelter as the sample carrier gas, the ventilation fan motor does not

have to be certified to gas group B or IIC provided the hydrogen supply is isolated outside the shelter upon loss of shelter pressurization.

7.9 The roof mounted ventilation fan motor shall be equipped with a manual starter or a contactor type starter mounted on the exterior of the shelter.

Commentary Note:

The requirement for an exterior mounted manual starter for the roof mounted ventilation fan provides a way to purge the shelter of any combustible vapors that may have accumulated during an extended power outage prior to entering the shelter and starting the HVAC system.

7.10 Ventilation or HVAC air handling unit fans shall be fabricated with spark resistant construction.

7.11 A flow switch shall be provided within the air duct of each HVAC air handling unit to give a low-flow alarm in the control room (or other constantly attended location) and to initiate a white beacon mounted outside the analyzer shelter door upon low-flow condition (recommend 60% of design flow). The two flow switches shall be voted (2-out-of-2) to alarm only upon loss of air flow through both the primary and the backup HVAC systems. A time delay of up to 1 minute may be used to prevent spurious alarms. Flow switches shall be certified for a Class 1, Division 1, Group B, C or D (Class I, Zone 1, Group IIC, IIB, & IIA) as necessary.

Upon loss of air flow through both the primary and the backup HVAC systems, the roof-mounted back-up fan shall be automatically started. Upon loss of all shelter ventilation (HVAC and back-up fan), the roof mounted back-up fan shall be started first to purge the shelter prior to restarting the HVAC system.

Commentary Note:

Because the interior of the shelter is classified as Class 1, Division 2 (Class I, Zone 2), all the equipment inside the shelter is suitable for use in a "limited release" environment (under normal operating conditions). Two failures are required to introduce a hazard inside the shelter (undetected pressurization failure for sufficient time for an explosive mixture to accumulate and a fault in the Class I, Zone 2 certified equipment). The design requirements are based on ANSI/NFPA 496, 9.3.8 (3) that offers an exception to automatic shutdown upon loss of pressurization if the anticipated release is "limited" and the analyzer room is classified as Class I, Zone 2.

7.12 Shelters containing analyzers monitoring toxic or flammable gases shall be vented directly to the atmosphere. No air from these rooms shall be re-circulated to any other room or part of the building.

7.13 Analyzer shelter HVAC system vibration shall not impact analyzer operation.

8 Combustible and Toxic Gas Detection

General Requirements

8.1 If a source of combustible or toxic gas is present, a combustible gas and/or toxicity detection instrument shall be installed in each shelter in accordance with SAES-J-505. The analyzer shelter gas detection monitors shall be integrated into the plant wide gas detection system that provides alarm indication and alarm management.

8.2 Detectors shall be located near the floor, ceiling, or both, depending upon the density of the gases being handled. At least one sensor for every 14 m^2 of floor area shall be installed.

8.3 Upon detecting gas, the combustible gas and/or toxicity detection equipment shall actuate both an alarm in the control room (or other constantly attended location) and a local alarm. The local alarm shall be audible both inside and outside the shelter with doors closed. In addition, separate warning light beacons mounted outside the shelter shall be provided; a blue beacon for high Hydrogen Sulfide and a red beacon for combustible gas.

Commentary Note:

Combustible and Toxic gas sensors should not be used to initiate automatic power isolation or to isolate the ventilation fans or air handling units. Refer to commentary note above in Section 7.12 for justification.

9 Shelter Layout Drawings

Shelter layout drawings shall be provided by the analyzer shelter integrator and approved by the proponent organization. The drawings shall include a plan view of the entire shelter with analyzer locations, shelter doors, and HVAC unit locations.

Revision Summary

4 May 2011	Revised the "Next Planned Update". Reaffirmed the contents of the document, and reissued with no other changes.
18 February 2013	Editorial revision to change the primary contact person.